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Dynamics of Social Networks

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Abstract

In the past decade Social Network Analysis (SNA) has become an established research field in the social and behavioral sciences as well as the natural sciences. The international conference on Applications of Social Network Analysis (ASNA) brings this interdisciplinary community together to assess the state of the field and discuss current developments and innovations in social networks research. The contributions selected for this proceeding were presented at the 7th ASNA conference, held at the ETH Zurich and University of Zurich (15-17 September 2010). The papers were selected in a peer review process, and reflect different applications of SNA with a special focus on the dynamics of social networks.

Keywords: Social network analysis; dynamic networks; applications of social network analysis

Social network analysis (SNA) suggests a broadening of focus from individual actors to sets of actors and the relationships among them. Hence, all applications of SNA have the common fundamental assumption that "context matters" (Friemel, 2008). In recent years, there has been an increasing awareness that the "context" also includes a temporal dimension. Hence, it is of interest whether, and how, the structure of a network is dependent on previous structures, or which future dynamics can be assumed to happen based on a given network. Also, most cross-sectional research includes implicit assumptions regarding dynamic processes of network evolution. This trend in SNA is reflected by an increasing number of publications on network dynamics (Snijders & Doreian, 2010), special software for the analysis of such dynamics (Ripley & Snijders, 2011) and dedicated conferences.

The international conference on Applications of Social Network Analysis (ASNA) is an interdisciplinary venue for academics and practitioners who apply SNA to a myriad of topics. "Dynamics of Social Networks" was chosen as the conference theme of the 7th ASNA conference (15-17 September 2010), held at ETH Zurich and the University of Zurich to address the increasing importance of longitudinal analysis of social networks. Both keynote speakers are recognized pioneers on the topic of dynamic processes in social networks. Among other accomplishments, Thomas W. Valente has made significant contributions to diffusion research (Valente, 2005), and Frans N. Stokman has served as co-editor for three special issues on network evolution in the *Journal of Mathematical Sociology* (Doreian & Stokman, 1996; 2003; Stokman & Doreian 2001). Furthermore, workshops were held on the software SIENA for stochastic actor-oriented models (by Tom A.B. Snijders and Johan Koskinen),

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the software Visone with its new features to visualize dynamic networks (by Ulrik Brandes and Jürgen Lerner), and the application of SNA for behavior change programs (by Thomas W. Valente).

About half of the 66 presentations at ASNA 2010 were full paper presentations eligible for inclusion in these proceedings. Out of these, 16 papers were submitted for possible publication. Finally, through a rigorous, peer review process, the seven best contributions were selected for publication in this volume. Six of these papers specifically address the conference theme of Dynamic Network Analysis. The first two contributions apply actor-oriented/agent-based models to analyze and simulate dynamic processes. Danica Vukadinovic Greetham, Robert Hurling, Gabriele Osborne, and Alex Linley investigate how positive and negative affect spread in a social network of 100 university students. They found that there is no evidence for influence processes but some indications of social selection processes. The second paper, by Adam Douglas Henry, presents a general agent-based model of network formation and belief change derived from the Advocacy Coalition Framework (ACF). His results show how assumptions of biased information processing at the micro level of individuals influence the emergence of belief-oriented segregation in policy networks. The third contribution, by Rudolf Ammann, contrasts these two quantitative and mathematical treatments of networks with a more qualitative approach. Ammann uses network theory and methods to describe the early history of the development of the blogosphere. The detailed study of the relations within the community of first bloggers puts a special focus on reciprocity and demonstrates that reciprocity is an indispensable precondition of community formation.

Analyses of dynamic networks, such as the first three papers in this volume, generally consider individual actors, their attributions, and their connections to other actors. There is, however, an increasing recognition of the importance of group detection within social networks. Two papers in this volume contribute to this important area of SNA research. Václav Belák, Marcel Karnstedt, and Conor Hayes propose a graph-theoretic technique for the detection of clusters, and apply it to co-citation in scientific communities. Mansoureh Takaffoli, Farzad Sangi, Justin Fagnan, and Osmar R. Zaïane apply their community-matching algorithm to the Enron email dataset and a scientific co-authorship network. Both of these papers discuss the challenges of defining groups in a dynamic setting and propose possible solutions.

Freeman (2004) refers to graphic representation of data as one defining element of SNA. The last two contributions to this special issue focus respectively on the visualization of social networks, and the use of SNA for the representation of non-relational data. Florian Windhager, Lukas Zenk and Paolo Federico discuss the advantages and disadvantages of different visualization methods for dynamic networks. They argue that an appropriate visualization may help non-expert users apply SNA to understand organizational change. According to Freeman another defining element of SNA is the use of systematic empirical data. Most applications of SNA deal with unimodal data in which actors are directly connected by ties. However, as early as 1894 John Atkinson Hobson studied the relations between companies linked by board members (Freeman 2004; Hobson 1894/1954). These kind of bimodal networks are of interest because it can be assumed that two actors belonging to a same company board or attending same events are likely to be somehow influenced by each other. It can be hypothesized that the broader the common (linking) group is defined the smaller this influence becomes. Nevertheless, even socioeconomic groups can be considered for this purpose. Hence, SNA can also be applied to census data. Sevic Rende, Deniz Rende, and Nihat Baysal do so and illustrate how network analytic ideas can be applied to understand social exclusion.

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